HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Squaxin Island / South Sound Net Pens
Species or Hatchery Stock:	Coho / Oncorhynchus kisutch
Agency/Operator:	Squaxin Island Tribe / Washington Department of Fish and Wildlife
Watershed and Region:	WRIA 14 / Peale Passage - Southern Puget Sound (Mason County)
Date Submitted:	3-17-03
Date Last Updated:	3-17-03

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program. Squaxin Island / South Sound Net Pen Coho Program

1.2) Species and population (or stock) under propagation, and ESA status.

Coho salmon (Oncorhynchus kisutch) Wallace River or Minter Creek Stock

1.3) Responsible organization and individuals

Name (and title): Will Henderson / Enhancement Manager
Agency or Tribe: Squaxin Island Tribe
Address: 2752 S.E. Old Olympic Hwy, Shelton, Wa. 98584
Telephone: (360) 426-9783
Fax: (360) 426-3971
Email: whenderson@squaxin.nsn.us

Name (and title): Rich Eltrich / Complex Manager
Agency or Tribe: Washington Dept. of Fish & Wildlife
Address: 600 Capitol Way North, Olympia, Wa. 98501-1091
Telephone: (253) 589-7233
Fax: (253) 589-7098
Email: eltrirje@dfw.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

The Washington Department of Fish and Wildlife (WDFW) is a co-operator with the Squaxin Island Tribe in the south sound net pen Coho program. WDFW contracts with the Tribe for labor services to feed and care for the fish while reared at the pens. Both agency's staff work cooperatively to develop rearing plans, implement release strategies, monitor fish health through pathology, fish sampling, and net pulling at release. WDFW purchases and supplies the Tribe with fish feed needed for the rearing duration.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources: WDFW / Squaxin Island Tribe / The Bureau of Indian Affairs

Staffing Level: Tribal staff for this program consists of 2-full time, and 2-six month positions along with various management, policy, and accounting personnel. In addition, WDFW personnel assist with management, fish transport, facility maintenance, and fish sampling and release as needed.

Operational costs : Approximately $250,000

Labor:	$148,000
Feed Costs:	$42,000
Supplies & Maintenance:	$50,000

1.5) Location(s) of hatchery and associated facilities.

Squaxin Island / SSNP
WRIA 14 / Peale Passage - Southern Puget Sound
Latitude: 47° 11'40'' Longitude: 122° 54'10"
Located in a cove on the East side of Squaxin Island in Peale Passage.

Skookumchuck Rearing Facility: 10500 Skookumchuck Rd. S.E. Tenino, Wa. 98589
Located 0.5 miles below Skookumchuck Dam on the Skookumchuck River. Tributary to the Chehalis River.

Wallace River Hatchery: 14418 383rd Ave. S.E. Sultan, Wa. 98294
Located on Wallace River (07.0940) at RM4, Tributary to the Skykomish River (07.0963)

Minter Creek Hatchery: Located on Minter Creek (15.0048) Tributary to Carr Inlet,Southern Puget Sound.

1.6) Type of program.

Isolated Harvest

1.7) Purpose (Goal) of program.

The program goal is to provide harvest opportunities for adult Coho Salmon not available with natural spawning populations in a terminal area fishery, for the members of the Squaxin Island Tribe. Production from this program also contributes to the non-tribal sport and commercial fisheries in the Strait of Juan de Fuca and most of Puget Sound.

1.8) Justification for the program.

South Sound Net Pen production provides a harvestable surplus of Coho salmon for Squaxin tribal fisheries. This terminal area fishery is managed to fish in and around the release site (Peale Passage) targeting returning hatchery fish. Tribal regulations exclude fishing in six nearby inlets that support natural coho production, minimizing interceptions of natural stocks. All program fish released from the net pens are mass marked with adipose fin-clipping and 2.5% of population coded wire tagged for future identification of returning adults. The Tribal coho fishery occurs during a time (late fall) when listed Chinook stocks would not be present.

1.9) List of program "Performance Standards

Goal (Section 1.7-1.8)	Performance Standard (Section 1.9)	Performance Indicator (Section 1.10)
Produce fish to meet harvest needs	Hatchery production contributes to harvest and maintains Tribal Treaty harvest rights by providing surplus coho for marine fisheries	1. Estimate the ocean survival rate and fishery exploitation rates for hatchery and wild fish.
Release practices allow fish to return to desired (fishery and hatchery) areas at the desired times.	The estimation of hatchery production contribution remains above 85% through-out the fishery period.	2. Estimate the hatchery contribution by area and time in the target fisheries
Limit genetic and ecological impacts to natural population to acceptable levels	The proportion of HOR spawners in the naturally spawning areas remains below 25%	3. Estimate the proportion of natural spawning population that is of hatchery origin
	Hatchery releases do not adversely affect listed salmon species	4. Estimate the abundance, temporal and spatial distribution of the netpen fish in the marine environment. Compare with known information about listed species.
	Hatchery releases do not negatively impact naturally produced juveniles	5. Estimate the abundance and the temporal and spatial distribution of the natural population.

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

(See table in question 1.9)

1.11) Expected size of program.

1.8 million to 2.6 million coho yearlings reared and released annually from the net pen program. We are currently conducting research to evaluate the most effective and least disruptive production level for the South Sound region.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

No broodstock collected at this facility. See HGMP for Wallace River and Minter Creek hatcheries.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and

location

Life Stage	Release Location	Annual Release Level
Yearlings	Peale Passage	1.8 to 2.6 million

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Updated 2003 WDFW Hatchery Coho Forecasts (Run Reconstruction Data)

Brood Year	Marine Survival Rates %	Adult Production	Escapement
1988	2.9	75,791	89
1989	4.6	92,242	134
1990	2.0	53,271	21
1991	4.6	104,494	95
1992	3.6	79,572	134
1993	3.0	64,801	49
1994	2.6	59,469	181
1995	1.9	47,736	200
1996	0.1	2,500	50
1997	3.7	73,399	133
1998	2.5	54,600	393

1.13) Date program started (years in operation), or is expected to start.

The Squaxin Island Tribe has been operating the net pen program for about 28 years, starting production in 1972. A cooperative agreement (FY82-10) between WDFW and the Squaxin Tribe was signed in 1983 outlining production levels and rearing conditions for the net pen program.

1.14) Expected duration of program. Ongoing

1.15) Watersheds targeted by program. Fisheries occurring in Strait of Juan de Fuca, Northern Puget Sound, WRIA 14 / (Southern Puget Sound) Carr Inlet, Southern Case Inlet, Peale Passage, Dana Passage, Pickering Passage.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed. N/A

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID

POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program. None

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

The net pen program does not collect broodstock, only rearing and release of coho already received from other hatchery stations. The broodstock collection for this program occurs at Minter Creek and Wallace River hatcheries. Please see their individual HGMP's for information regarding potential take actions on listed fish.

- Identify the ESA-listed population(s) that will be directly affected by the program.

Unknown

- Identify the ESA-listed population(s) that may be incidentally affected by the program.

Puget Sound Chinook:

Nisqually Summer / Fall Chinook: Stock specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other South Puget Sound fall Chinook populations (Puyallup River and Green River fall Chinook). Adults are presumed to be predominantly 4-year olds at return (60-80%), with smaller components of 2-year-olds (<10%), 3-year-olds (10-20%), 5-year-olds (5-10%) and 6-year-olds (<1%). Size at age is expected to be similar to the data listed below for Puyallup and Green River fall chinook.

Chinook spawning habitat in the mainstem Nisqually River is available from river mile 3 to just above the mouth of the Mashel River (approximately river mile 40). Chinook have been documented spawning in the accessable reaches of the Mashel River and Ohop Creek. There is occasional chinook utilization of 25 Mile Creek, a tributary to Ohop Lake.

River entry of mature adults begins in July and extends through September. Spawning occurs from early September through October. Most Nisqually River fall chinook juveniles likely migrate to salt water as zero age smolts after only a few months of freshwater residence. If migration timing is similar to Green River stock, the outmigration likely peaks in May. After several weeks of estuarine acclimation and feeding, the juveniles move off to feeding grounds in Puget Sound and the Pacific Ocean.

South Sound Tributary Summer/Fall Chinook. South Sound tributary Chinook are considered to be derived from hatchery Chinook straying into the small strteams of the area. Spawning

ground, juvenile life history, survival and productivity data are generally lacking for this production as they are not considered to be a naturally reproducing stock of fish. The population is presumed to be similar in biological characteristics to the other south Puget Sound fall chinook populations (Puyallup River and Green River fall chinook), since it is thought to be dependent on ongoing hatchery production (strays) in south Puget Sound. SASSI defines this stock as naturally spawning chinook in a number of widely distributed strea,s and rivers, including McAllister Creek, Grovers Creek, Gorst Creek, Chambers Creek, Carr Inlet tributaries, the Deschutes River and other small streams in south Puget Sound.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- **Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds**

Critical/Viable population thresholds under ESA have not been determined for the South Sound area. However, they have been identified as a Category 3 stock by the National Marine Fisheries Service. This characterization will not require specific recovery goals. The updated SASSI report (2002) determined that status of the South Sound Tributary Summer/Fall Chinook, and Nisqually Summer/Fall Chinook stocks are "healthy".

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Nisqually River Fall Chinook – Unknown

South Sound Tributaries Fall Chinook – Unknown

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Estimates of fall chinook spawning naturally in the Nisqually River:

Year	Spawning number
1988	1342
1989	2332
1990	994
1991	953
1992	106
1993	1655
1994	1730
1995	817
1996	606
1997	340
1998	834
1999	1399

Estimates of fall chinook spawning naturally in South Sound Tributaries:

Year	Spawning numbers
1988	4257
1989	4979
1990	15814
1991	3681
1992	3610
1993	2998
1994	4950
1995	7456
1996	14931
1997	4192
1998	6372
1999	11028

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Nisqually River fall chinook - Unknown. There are inadequate spawning ground sampling data to estimate proportions.

South Sound Tributaries fall chinook - Unknown, although SASSI states that stock status is dependent upon local hatchery production.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

There is no impact to adult listed fish from program operation since no broodstock are collected. At this time it is unknown if releases of coho salmon into Peale Passage at a time when listed fish may be present constitutes a take of listed fish. See individual HGMP's for Minter Creek and Wallace River hatcheries.

- **Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish**.

Unknown – See individual HGMP's for Minter Creek and Wallace River hatcheries.

- **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

Unknown – See individual HGMP's for Minter Creek and Wallace River hatcheries. The extent of possible adverse competitive effects of hatchery juveniles on listed populations is not quantified at this time but thought to be low.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

N/A

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

N/A

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Puget Sound Management Plan (PSSMP 1985) sets out the legal framework under which co-management of hatchery programs occur. A cooperative rearing agreement (FY82-10) between WDFW and the Squaxin Tribe outlines South Sound Net Pen management and annual production.

3.3) Relationship to harvest objectives.

Harvest impacts to listed fish are minimized in the following manner:

- Tribal fisheries are managed to occur in and around the coho release site (Peale Passage) and regulations exclude fishing in the six nearby inlets (Upper Case, Hammersly, Totten, Eld, Budd, and Henderson inlets) that may support naturally produced coho runs. This fishery occurs during a time (late fall) when listed Chinook stocks would not be present.
- All program fish are 100% mass marked (adipose fin clipped)for identification of returning hatchery adults which allows release of fish with adipose fins in selective recreational fisheries.
- Tribal fishers predominantly use beach seine nets in this fishery, allowing for the live release of listed or naturally produced fish, unlike gillnets.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Commercial and recreational fisheries in the Strait of Juan de Fuca, Puget Sound, and Squaxin Island Tribal fisheries in southern Puget Sound. The goal of the Tribal fishery is to catch 100% of returning adult coho salmon released from the net pen program while minimizing incidental catch of naturally spawning coho.

3.4) Relationship to habitat protection and recovery strategies. N/A

3.5) Ecological interactions.

Predators such as otters, birds, seals, and other fish species have a negative impact on this program, during the rearing season and at release. Otter predation has the most significant impact, causing stress and reducing the rearing population of fish by an unknown amount.

The ecological or interactive impacts this coho program has on other species in marine waters is unknown. Hatchery fish can interact with listed fish species through competition and predation (Fresh 1997). Enhancement program fish can negatively impact listed native fish populations through reduced growth, survival and abundance. Several methods have been developed to assess potential negative ecological interactions and risks associated with hatchery programs (Pearsons and Hopley 1999; Ham and Pearsons 2001).

The degree to which fish interact depends upon life-history characteristics which include: 1) size and morphology, 2) behavior, 3) habitat use and 4) movements (Flagg et al. 2000). Important considerations associated with hatchery practices include the type of species reared, fish size at time of release, number of fish released and location(s) of program releases. Interaction potential between hatchery origin fish and natural origin fish can also depend on habitat structure and system productivity. For example, habitat structure can influence predator-prey encounter rates (visibility), the amount of preferred spawning habitat and fish susceptibility to flushing flows. System productivity determines the degree to which fish populations may be food-limited, and thus negatively impacted by density-dependent effects. The type and degree of risk associated with releases of program fish typically involve complex mechanisms. Actual identification and magnitude of causal mechanisms negatively impacting listed fish is not always definitive due to confounding factors such as human-induced environmental changes, indirect pathway effects and the diversity of environments salmon occupy throughout their life-cycle (Li et al. 1987; Fausch 1988; Fresh 1997; Flagg et al. 2000). Given these complex mechanisms and site-specific considerations it is not surprising that for most hatchery programs, the extent of possible adverse competition and predation effects of hatchery releases on listed fish populations throughout Puget Sound have not been explicitly documented or quantified.

Releases of yearling coho salmon from enhancement facilities may pose a predation risk on juvenile fall chinook and chum salmon in the marine environment (Hargreaves and LeBrasseur 1985; Hawkins and Tipping 1999; Pearsons and Fritts 1999). Actual rates of predation by program releases of yearling coho salmon from the Squaxin Island netpens on juvenile chinook and chum salmon are unknown at this time.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Puget Sound seawater is the source used for this program. Tidal currents are utilized for water exchange and flow required to rear fish. Annual water temperatures vary with the climate, with an average low 44°f in the winter to 63°f in the summer months.

Skookumchuck Hatchery: Approximately 20 cubic feet per second (cfs) of water is supplied to two 1/2 acre ponds and one 8' X 80' X 3' raceway by gravity flow from the Skookumchuck Reservoir. Water temperature can be regulated (40-56°f) by three intake levels in the reservoir. This facility operates under an NPDES permit (WAG-13-1042)

See Wallace River and Minter Creek hatcheries HGMP's for natal water source.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Net Pens: Water is passively used by current flow through the pens. There is no known impact to listed fish from this program.

Skookumchuck: The watershed is not in the ESU and has no direct link or contact with the listed species

See individual HGMP's for Wallace River and Minter Creek hatcheries.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock are not collected at the netpen facility:
See HGMP for Wallace River and Minter Creek hatcheries.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Wallace River to Skookumchuck Facility:
Tanker trucks with water volumes between 1000 and 1800 gallons are used to transport fish from Wallace River to the Skookumchuck facility. Fish poundage hauled in trucks is capped at 0.5lbs

of fish per gallon of water (400 fish per pound at transfer). All trucks use oxygen and re-circulating pumps to maintain a healthy hauling environment Salt is used for transport to reduce stress on the fish.

Wallace River / Skookumchuck to South Sound Net Pens:
The same trucks are used to transport fish from Skookumchuck to the Harstine Island bridge, where the fish are transferred into 2 tanks aboard a fish transport barge. The transport tanks on the barge are fiberglass constructed circular tanks with a water capacity of approximately 2500 gallons per tank. The fish are then barged to the awaiting net pens. Fish poundage is capped at 1.0 lbs of fish per gallon of water (Fish transferred from Wallace or Skookumchuck to SSNP @ 25 FPP). During fish transport, seawater is circulated thru each tank by an on-board water pump. Regulated supplemental oxygen is also supplied to the tanks thru carbon stone filters.

5.3) Broodstock holding and spawning facilities.

N/A: See HGMP for Wallace River and Minter Creek hatcheries.

5.4) Incubation facilities.

N/A: See HGMP for Wallace River and Minter Creek hatcheries.

5.5) Rearing facilities.

The net pen rearing site consists of a North and South complex (two separate structures). The North and South complexes are anchored steel net pen structures with overall dimensions at 300 feet in length by 90 feet in width. In each of these structures there are eight 40' X 40' openings that allow for nets to be placed. The nylon mesh nets used are 40' X 40' by 12ft in depth and create an underwater cage for rearing fish. Coho yearlings are transferred from the Skookumchuck facility to the net pens in January at a size of 25-28 fish per pound, reared in the pens for six-months, and then released into Puget Sound during the month of June at 10-12 FPP.

Skookumchuck Facility:

Skookumchuck Pond is located on the Skookumchuck River below the Skookumchuck Dam. This facility has two asphalt ponds (each pond is 0.85 surface acres). Each pond can flow 6,000 gpm. A rotating screen and stoplog maintain water level and keep fish in the pond.
The upper pond can be divided into two sections by setting a series of screens into slotted channels at the mid-point of the pond. Predator control measures include a bird netting cover. Skookumchuck also has one vinyl pond (8x80x3). Flow to this pond is approximately 200 gpm. this pond is not used a this time.

5.6) Acclimation/release facilities.

Same as above (5.5) Fish are acclimated / released from the seawater net pen site.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Skookumchuck Facility: Unknown predator loss can result in pond shortage and inability to meet program goals.

Net Pen Operation:
1. Predators (otter) reduce the release population by an unknown amount and cause stress to fish remaining in pens.

2. Toxic marine organism blooms can cause mortality or stress to coho rearing in the net pens. This condition is dependent on weather patterns conducive to bloom outbreaks, principally tempertaur eincreases and solar radiation. In general this does not happen very often.

3. Disease pathogens such as Bacterical Kidney Disease (BKD) or Vibrio have resulted in early release's due to mortailty and inability to treat fish before release. This has occurred infrequently during the life of the program and is considered an exception rather than the norm.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Net Pens: Although this program does not experience most of the conditions listed above, Tribal staff are on site six days per week and are readily available to monitor and respond to emergencies at the pens. During a marine organism bloom fish are monitored for stress signs and not fed if bloom is causing mortality. If mortality is high, fish may be released early to allow them to seek water clear of the bloom. It is unknown if this action would result in adverse effects on listed stocks in the area. It is important to note that out of 30 years of operation, fish have not been released due to algae bloom only.

Skookumchuck Facility: Not located in listed ESU, loss of fish does not affect listed stock

See individual HGMPs for: Wallace River and Minter Creek Hatcheries

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Broodstock Source.

The historical source for broodstock has been Skykomish-Wallace River coho. At times Minter Creek stock has also been used to fulfill production levels. The current program is evolving and for the 2000 and 2001 brood years, the stocks to be used may be Minter Creek along with Wallace River. Through the process of hatchery reform and reviews conducted by HSRG, it was

recommended to use a local broodstock (Minter Creek) for the coho production at the net pens. This would address the concerns of out of basin stock transfers, which could possibly increase stray rates and reduce survival. To address the recommendations it was agreed to conduct a three year study (Squaxin Tribe / WDFW) to examine the relative return rates and straying of net pen coho based on broodstock sources (Minter versus Wallace) and rearing locations. The study is currently in progress.

6.2) Supporting information.

6.2.1) History..

Historic Coho Broodstock Used At Squaxin / SSNP

BY	Stock	BY	Stock
1975	Issaquah Cr.	1988	May Cr./ Issaquah Cr./Minter Cr.
1976	Issaquah Cr.	1989	May Cr./ Issaquah Cr./Big Soos Cr.
1977	Issaquah Cr.	1990	May Cr./ Issaquah Cr./Minter Cr.
1978	Issaquah Cr./ Clark Cr.	1991	May Cr./ Minter Cr.
1979	Issaquah/Soleduck/SPS	1992	May Cr./ Minter Cr.
1980	Minter Cr./Skykomish R.	1993	Skykomish / Minter Cr.
1981	May Cr./Clark Cr.	1994	Skykomish River / Finch Cr.
1982	May Cr./Clark Cr./Purdy Cr.	1995	Skykomish River
1983	May Cr./Minter Cr./Purdy Cr.	1996	Skykomish River
1984	May Cr./Minter Cr./Purdy Cr.	1997	Skykomish / May Cr.
1985	Skykomish/Minter Cr./Purdy Cr.	1998	Skykomish / May Cr.
1986	Skykomish/Minter Cr.	1999	Skykomish / May Cr.
1987	May Cr./ Issaquah Cr./Minter Cr.	2000	Skykomish / Minter Cr.

For Broodstock sources please refer to the HGMPs for Wallace River and Minter Creek Hatcheries.

6.2.2) Annual size.

For annual size please refer to coho HGMPs from Wallace River and Minter Creek Hatcheries

6.2.3) Past and proposed level of natural fish in broodstock.

For past and proposed levels of natural fish in broodstock, please refer to the HGMP for coho at Minter Creek Hatchery and Wallace River Hatchery

6.2.4) Genetic or ecological differences.

For genetic or ecological differences please refer to the HGMP for coho at Minter Creek Hatchery and Wallace River Hatchery

6.2.5) Reasons for choosing.

Skykomish/Wallace River has been the primary egg source for the net pen program. This stock

was chosen for its ability to consistently supply this program with surplus coho to meet production numbers. Unlike other broodsources, this stock has not been prone to disease problems.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Please refer to the HGMP for coho at Minter Creek Hatchery and Wallace River Hatchery

SECTION 7. BROODSTOCK COLLECTION

See HGMP for Wallace River and Minter Creek hatcheries for all of Section 7.

7.1) Life-history stage to be collected (adults, eggs, or juveniles). Adults

7.2) Collection or sampling design.

7.3) Identity.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

7.6) Fish transportation and holding methods.

7.7) Describe fish health maintenance and sanitation procedures applied.

7.8) Disposition of carcasses.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

See HGMP for Wallace River and Minter Creek hatcheries for all of Section 8.

8.1) Selection method.

8.2) Males.

8.3) Fertilization.

8.4) Cryopreserved gametes.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

See HGMP for Wallace River and Minter Creek hatcheries for all of Section 9.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

9.1.2) Cause for, and disposition of surplus egg takes.

9.1.3) Loading densities applied during incubation.

9.1.4) Incubation conditions

9.1.5) Ponding.

9.1.6) Fish health maintenance and monitoring.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

Fingerling to smolt – approximate 97 percent survival to release

Year	Life Stage	Fish In	Fish Planted
1988	Fingerling to Smolt	2,348,878	2,331,555
1989	Fingerling to Smolt	2,500,500	2,451,000
1990	Fingerling to Smolt	2,776,455	2,613,490
1991	Fingerling to Smolt	2,102,787	2,005,250
1992	Fingerling to Smolt	2,708,690	2,663,551
1993	Fingerling to Smolt	2,388,975	2,271,600
1994	Fingerling to Smolt	2,340,539	2,210,325
1995	Fingerling to Smolt	2,202,050	2,160,025
1996	Fingerling to Smolt	2,346,000	2,287,292
1997	Fingerling to Smolt	2,617,000	2,512,400
1998	Fingerling to Smolt	2,671,600	2,500,200
1999	Fingerling to Smolt	2,015,000	1,983,755
2000	Fingerling to Smolt	2,284,700	2,270,700

9.2.2) Density and loading criteria (goals and actual levels).

Our goal is to raise fish to a size of 10 FPP by release time. The maximum densities given this size, fish per pen and pen size is 0.56 lbs./cuft in the 20x40x10 pens and 0.57 lbs./cuft in the 28x28x10 pens. Release size for these fish have historically ranged from 13 to 10 FPP. Density limits have not been exceeded.

9.2.3) Fish rearing conditions

Fish are reared in seawater with water temperatures in the range of 44°/ 48° in winter months to 52°/58°f in late spring. Tidal influence (high and low) occurs twice daily and salinity ranges from 26 to 31-parts per thousand.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Monthly Growth Rates

Month	FPP	Length	C-Factor
Jan	22	115.7	4.41

Feb	20	121.7	4.50
March	17	126.4	4.63
April	14	132.7	4.86
May	10	158.1	3.94
June	9	163.5	4.01

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not Available

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Food types currently used: Moore Clarks fry 2.5mm dry diet / Ewos Pacific 3.0mm dry diet
Daily Application Schedule: Hand fed daily / six days per week
Feed Rate and Range: 1.0 to 1.5 percent body weight
Feed Conversions: 0.95 to 1.2

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Preventive care is promoted through routine fish health monitoring. WDFW Pathologists conduct fish health exams and evaluate rearing conditions during monthly visits to the hatchery site. Exams include lethal sampling of a small number of fish to assess the overall health status of the population and detect possible pathogens of concern. Results are reported to hatchery managers along with recommendations for treatments and improving or maintaining fish health.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

N/A

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

N/A

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

N/A

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Yearling	2.6 million	10.0	May /June	Peale Passage

10.2) Specific location(s) of proposed release(s). Peale Passage
Stream, river, or watercourse: WRIA-14 South Puget Sound
Release point: Latitude-47° 11'40" Longitude-122° 54'10"
Major watershed: Southern Puget Sound
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988	N/A		N/A		N/A		2,331,555	9.8 fpp
1989	N/A		N/A		N/A		2,451,000	10.3 fpp
1990	N/A		N/A		N/A		2,613,490	9.5 fpp
1991	N/A		N/A		N/A		2,005,250	10.1 fpp
1992	N/A		N/A		N/A		2,663,551	11.5 fpp
1993	N/A		N/A		N/A		2,271,600	13.3 fpp
1994	N/A		N/A		N/A		2,210,325	13.4 fpp
1995	N/A		N/A		N/A		2,160,025	13.6 fpp
1996	N/A		N/A		N/A		2,287,292	12.6 fpp
1997	N/A		N/A		N/A		2,512,400	11.0 fpp
1998	N/A		N/A		N/A		2,500,200	9.9 fpp
1999	N/A		N/A		N/A		1,983,755	12.1 fpp
Average							**2,332,537**	**11.4 fpp**

10.4) Actual dates of release and description of release protocols.

Yearling Coho Release Dates:
1996: May-15-30 June-1-12

1997: May-14-15 May-20-21 May-27-28 June-3-6
1998: May-12-21 June-2-11
1999: May-11-13 May-18-20
2000: May-16-19 May-23-25

In order to reach target fish size at release, and rearing conditions are acceptable (water quality, tidal influence, fish health, etc.), the target release timing for this program is June 1, thru June 15. Release protocol consists of net pen personnel detaching the nets from the pen structure and pulling the nets out of the water, forcing the fish into open water. Six net pens (approx. 300,000 coho) three days per week are released until gone. This allows each release group adequate time to disperse fom the net pen area and also reduces fish loss due to predation from seals and otter at release time. Once released, the fish rely on natural food sources to survive, which is limited in this area. To avoid added stress, disease, and mortality on the reared fish, earlier than normal releases have occurred due to increased water temperatures along with extreme low seawater tides limiting oxygenated water supply through the nets.

10.5) Fish transportation procedures, if applicable.
N/A All releases are at site

10.6) Acclimation procedures (*methods applied and length of time***).**
N/A

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All coho released from the net pen program are one hundred percent mass marked with adipose clipping. Along with adipose clip, approximately (50,000 fish) 2.5% of the population are implanted with a coded wire tag for identification.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

N/A

10.9) Fish health certification procedures applied pre-release.

Fish reared at the net pens are monitored daily by net pen personnel for mortality or any early signs of health or possible disease problems. Monthly inspections for health and conditions of fish are performed by WDFW pathologists. Prior to release, fish are examined and depending on the outcome, recommendations will be made to release the fish as planned. If a health problem is encountered, appropriate management actions will be taken prior to release.

10.10) Emergency release procedures in response to flooding or water system failure.

N/A. Emergency release at the pens would be in response to water quality failure do to a hazardous material spill such as an oil spill. Containment booms are on-site for this type of event.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

The net pen program is operated as a delayed release program. Coho are transferred to the pens in late January and reared until release in June. The extent of negative and adverse effects this program has on listed fish after release is unknown. Given the perceived risks of hatchery programs, net pen coho are reared and released in a manner to minimize potential negative impacts to Chinook salmon and bull trout populations. These measures include:

Delayed Release: Net pen fish are reared and released in seawater, so there is no freshwater competition, interactions, or predation. Timing of release is intended to minimize co-occurrence and overlap with life history characteristics of listed fish. Numbers of fish released are staggered over a two- week period to allow fish to disperse between release days.

Delaying release also allows for program fish to reach a larger size (average 45 grams), which is thought to increase the likelihood of rapid out-migration behavior from southern Puget Sound. The larger size also promotes their utilization of deeper water habitat and feeding patterns, thus reducing interaction in the nearshore marine environment.

The rearing and release location of the net pen facility is in an area that significantly reduces interaction potential, to listed fish. Releases from the facility occur in the central part of the marine basin, removed from the shallower freshwater estuary areas associated with the many inlets of the southern sound.

Reduced Production: Historic release numbers for the net pen program have averaged 2.5 million coho annually. In recent years production has been temporarily reduced to 1.8 million fish released. This reduction was in response to recent low return rates and poor ocean survival of coho destined for south sound.

Due to concerns about the productivity and carrying capacity of South Puget Sound (south of the Tacoma Narrows) the production level has been reduced by 25% from a target of 2.4 million coho smolts to a current production target of 1.8 million coho smolts. In addition, studies are under way to better characterize the productivity of the marine environment in this area. One goal of the studies will be to determine an appropriate range of enhancement production that can be supported over the range of natural fluctuations in the marine environment.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Performance Indicator (Section 1.10)	**Methods/Comments** (Sections 11 and 12)
1. Estimate the ocean survival rate and fishery exploitation rates for a tagged group	This requires a tagging program of the hatchery production and recovery of tags in all locations, including ocean and terminal fisheries, hatchery and natural escapement. All hatchery coho production is mass marked using the adipose fin clip. In addition, a portion of the fish are marked with coded wire tags in order to compare groups of fish for brood and behavior characteristics.
2. Estimate the hatchery contribution by area and time in the target fisheries	This requires mass marking or tagging of hatchery production and sampling of the target fisheries, stratified by area and time. This study is currently being conducted. Data has been collected over the last four years within the Tribal fishery.
3. Estimate the proportion of natural spawning population that is of hatchery origin	This requires mass marking or tagging of hatchery production and sampling of naturally spawning population. The entire enhancement production is mass marked and a portion are coded wire tagged. Intensive spawning ground surveys are conducted by visual inspection and with metal detecting equipment to identify any hatchery fish straying onto the spawning grounds.
4. Estimate the abundance, temporal and spatial distribution of the netpen fish in the marine environment. Compare with known information about listed species.	This requires a research project to tag and track netpen fish when they are released to determine their distribution and timing for migrating through the Puget Sound marine environment. We have initiated an acoustic tagging program to accomplish this task.
5. Estimate the abundance and the temporal and spatial distribution of the natural population.	This requires a research project to establish the optimum time/area strata for release that would minimize impacts on natural spawning populations.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring and evaluation activities are not likely to have any ecological effects on listed fish species.

SECTION 12. RESEARCH

Research project: Acoustic Tagging of Coho Smolts

The Tribe is conducting acoustic tagging of coho smolts released from its netpen program in order to track distribution of these fish once they have been released. The intention is to measure survival and migration timing in the South Sound marine environment. This should allow us to

better assess whether these fish have any potential interaction with listed species such as Chinook originating from the Nisqually River.

Little is known about the duration of South Puget Sound (SPS) habitat use by juvenile salmon. This lack of information makes it difficult to address concerns of co-occurrence and competition between juvenile salmonids of hatchery and wild origin. Furthermore, questions have been raised by the co-managers concerning carrying capacity of SPS in relation to hatchery production. The Hatchery Scientific Review Group has echoed these concerns (South Puget Sound Regional Review, August 2001). While State and Tribal interests have initiated development of a trophic level model (ECOPATH) to assess productivity, specific issues remain largely speculative without directed research. Throughout the past decade, the relatively poor return rates for Coho salmon stocks in SPS may be partially attributable to a bottleneck in juvenile salmonid survival in the marine environment, unique to this region (Preikshot and Beattie 2001). This hypothesis remains largely speculative without region specific information on use and residency by juvenile Coho salmon

This project is partially funded by the Tribe and by using Salmon Recovery dollars aimed at Hatchery Reform. The principals are Jeff Dickison for the Tribe and David Welch with Kintama Research out of Canada. There is no take of listed fish.

Research project: Examine Relative Return Rates And Straying Of Coho Based On Broodstock And Intermediate Rearing Locations

Presently, 86% 0f the 1.8 million SSNP Coho salmon originate as eggs from Wallace River Hatchery (Skykomish River), which are incubated, hatched, and early reared (400/lb) at Marblemount Hatchery (Skagit River). Fish are then transferred to the Skookumchuck rearing facility (Chehalis River Basin) for intermediate rearing (23/lb) and then transferred to the net pens in January. The remaining 350,000 fish are transferred directly from the Wallace River Hatchery to the net pens in January at (25/lb). Smolts are reared to approx.(10/lb) and released in May/June.

There is concern that using non-local broodstock at the SSNP facility may reduce fish survival and increase straying rates. In addition, the transferring of fish between multiple rearing sites may add to straying and reduced fish survival. This project seeks to use coded wire tags and monitoring to determine the relative post-release survival and stray rates of SSNP Coho from; 1) local versus distant broodstock and 2) multiple versus single juvenile fish transfers.

The fundamental premise for this program has been to rear all fish outside the basin to concentrate returning adults to one area, the net pen site. After the HSRG review of the South Sound Net Pen program in August 2001, recommendations were made that “the broodstock source for this program should be changed to a local broodstock, probably from Minter Creek hatchery, to reduce straying of returns from this program.” It was also recommended that, “incubation and rearing should also come from within the region, at Minter Creek …”. After

discussions about using out of region rearing to focus the returning coho back to the pen sight, concerns were raised that using Minter stock might alter the migration of the fish back to Minter Hatchery instead of the net pen area. This program is intended for Tribal harvest in a terminal fishery around the pen site (Peale Passage) and not in Carr Inlet (Minter Creek site). To address these concerns, it was recommended to monitor and evaluate the different stray rates and fish survival/ contribution to the fishery using local versus distant broodstock and multiple rearing strategies. This proposal is consistent with the HSRG recommendations and seeks to accomplish a three release year study using coded wire tagging and tag recovery data to monitor and evaluate brood sources appropriate for this program.

Project Objective(s): To monitor and evaluate the stray rates and fish survival/contributions using local versus distant broodstock sources at South Sound Net Pens for three consecutive years by:

1. Applying coded-wire tags with unique codes to 100,000 fish from each brood source: Minter Creek reared at Minter Creek, Minter Creek reared at Marblemount and Skookumchuck, and Skykomish reared at Marblemount and Skookumchuck. (300,000 total).
2. Using multiple rearing /transfer strategies (Wallace River/ Marblemount via Skookumchuck via SSNP) versus single rearing/transfer (Minter Creek via SSNP)
3. Each group will share common rearing regimes at the hatcheries and at South Sound Net Pens until final release.
4. Monitoring and recovery of tagged adults will occur through the statewide mark recovery program, adults returning to individual hatcheries, sport and commercial catch sampling, and fall stream surveys conducted by Tribal and WDFW survey crews.

Traditional methods of recovery and analysis of coded wire tags will be utilized. Tags will be recovered from fisheries and enhancement facilities according to existing protocols. In addition, stream surveys in the South Puget Sound area will employ tag detection wands to scan in-stream fish carcasses for coded wire tags. Normal expansion techniques will be used for estimating total fish counts.

This project is dependent on a partnership between the Washington Department of Fish and Wildlife and the Squaxin Island Tribe. It requires shared funding and shared deployment of resources and personnel to recover and evaluate CWTs. It is currently our expectation that these commitments can be met by the State and the Tribe. There is no take of listed fish.

SECTION 13. ATTACHMENTS AND CITATIONS

Fausch KD. 1988. Tests of competition between native and introduced salmonids in streams: what have we learned? Canadian Journal of Fisheries and Aquatic Sciences 45:2238-2246.

Flagg TA, Berejikian BA, Colt JE, Dickhoff WW, Harrell LW, Maynard DJ, Nash CE, Strom MS, Iwamoto RN, Mahnken CVW. 2000. Ecological and behavioral impacts of artificial production strategies on the abundance of wild salmonid populations; a review of practices in the Pacific Northwest. NOAA Technical Memorandum NMFS-NWFSC-41.

Fresh KL. 1997. The role of competition and predation in the decline of Pacific salmon and steelhead. In: Stouder DJ, Bisson PA, Naiman RJ, Duke MG, editors. Pacific salmon and their ecosystems. New York, NY: Chapman and Hall. p 245-275.

Ham KD, Pearsons TN. 2001. A practical approach for containing ecological risks associated with fish stocking programs. Fisheries 26(4):15-23.

Hargreaves NB, LeBrasseur RJ. 1985. Species selective predation on juvenile pink (*Oncorhyncus gorbuscha*) and chum salmon (*O. keta*) by coho salmon (*O. kisutch*). Canadian Journal of Fisheries and Aquatic Sciences 42:659-668.

Hawkins SW, Tipping JM. 1999. Predation by juvenile hatchery salmonids on wild fall chinook salmon fry in the Lewis River, Washington. California Fish and Game 85(3):124-129.

Li HW, Schreck CB, Bond CE, Rexstad E. 1987. Factors influencing changes in fish assemblages of Pacific Northwest streams. In: Matthews WJ, Heins DC, editors. Community and Evolutionary Ecology of North American Fishes: University of Oklahoma Press, Norman and London. p 193-202.

Pearsons TN, Fritts AL. 1999. Maximum size of chinook salmon consumed by juvenile coho salmon. North American Journal of Fisheries Management 19:165-170.

Pearsons TN, Hopley CW. 1999. A practical approach for assessing ecological risks associated with fish stocking programs. Fisheries 24(9):16-27.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Hatchery Operations				
Location of hatchery activity: Peale Pass (S.S Net Pens) Dates of activity: January-June Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown		
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.

2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).

3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Hatchery Operations				
Location of hatchery activity: Minter Creek Dates of activity: September-December Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)			Unknown	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.

2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).

3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.